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EXAMINATION OF CONSUMERS' INTENTION TO ADOPT AN ONLINE RETAILER: BRAND KNOWLEDGE, PERCEIVED RISK AND ONLINE BUYER BEHAVIOR

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ABSTRACT

The paper first draws the attention about online retailing from technological standpoints to the marketing perspective. Then it develops a conceptual model based on brand theory, risk theory and information theory to understand consumers' intention to adopt any online retailer as well as some associated online behavior, with brand knowledge as a cornerstone of online retail service marketing and perceived risk as the mediator transforming the impact. In research methodology part, the authors propose a hypothesized empirical study with precise logics and steps. More advanced analytical tool, structural equation modeling is applied to guide the analysis and interpretation of the results. It's concluded by more discussions on the study itself and future directions.

INTRODUCTION

The exponential growth of Internet adoption is raising expectations about the size of the worldwide market for e-commerce [44]. Today, an increasing number of companies are transacting through electronic-commerce markets and environments such as the Internet. Online retailing, which offers consumers a shopping experience distinct from physical-based retailing, has been promoted in one form or another for more than twenty years [47]. Compared with the expansion of Internet users, the number of online shoppers increases at a lower pace. According to some online surveys concerning online purchasing behavior (e.g., [28]), among major obstacles preventing Internet users from online shopping, privacy and security considerations are the mast. The stumbling block cited most often by merchants and consumers alike is fear. "Consumers – particularly inexperienced surfers – worry about what might happen if they send their credit card data over the Internet", says Maria LaTour Kadison, Forrester senior analyst [17, p.175]. As a result, when it comes to addressing the problem of customer adoption of the online shopping channel, people are putting too much emphasis on a perspective dominated by technological considerations, which seem directly tackle privacy and security issues [44].

This seemingly diagnostic treatment ignores the fact that with the development and standardization of technology, little difference can actually exist among online retailing stores regarding security matter. Does that mean all online retailers will be successful then? We can definitely come out with a straightforward answer, no. With the ease of setting up virtual stores, tens of thousands online retailers are emerging everyday, with totally commodities provided largely exceed the real purchasing power. How can all of them or at least a large proportion of them be profitable? Although some online retailers are so successful, Amazon, for example, among the most celebrated companies in today's business world, increased its revenue to \$147.8 million in 1997, up from \$15.8 million in 1996 [19]; most of them disappear before being known on the other hand. Without being known by consumers, no matter how much retailers take efforts in their technological improvement, all things go into none. The potential of online market is unlikely to be fully realized without a wider exploration of consumer needs and expectations [44]. The solution of a new issue also lies on the responsibility of an old theme - marketing.

Theoretically, although there is a lot of speculations about the impact of the Web on online consumer purchasing behavior [23], most are exploratory in nature, with little deep insight in understanding some crucial casual relationships contributing to the prosperity of online retailing thus far. In other words, little formal research has been devoted to understand factors influencing propensity to choose among a plenty of online retailers. This problem is pending by realizing that: (a) Even through electronic commerce is small, compared with the size of traditional goods and service sectors, it is estimated that sales through this new channel to market could be more than \$US 7.29 trillion by the year 2004 [18]. The future prosperity of this industry raises a big practical issue that deserves to be fully developed. (b) The total amount of online retailers is enormous and the number is increasing at a dramatic speed, although the actual volume of retail sales on the World Wide Web remains low [23] compared with the size of traditional

goods and service sectors. Most of them die in babyhood, without even having any consumers involved. Therefore, although technological developments are necessary, they are far from sufficient for consumer acceptance, not to mention they can interpret the selection inclination to any particular provider. Since too much fear is put on privacy and security, especially credit card information, it's logic to infer that once consumers give out their credit card, they are reluctant to convert to other retailers. So, the potential values of attracting the first adoption by consumers are vast.

Called from real issues, the paper tries to answer the following questions: Is there anything related to marketing issues that might contribute significantly to the adoption of an online retailer by their prosperous consumers? What's the overall contribution made by a retailer' marketing efforts that could interpret consumers' buying intention, in other words, approximately how much proportion of an online retailer consumers adoption can be explained by some marketing issues other than practical technology improvement.

To meet the objective, the paper develops a conceptual model based on brand theory, risk theory and information theory to understand consumers' intention to adopt any retail provider and some associated online behavior, with brand knowledge as a cornerstone of online retail service marketing and perceived risk as the mediator transforming the impact. Essentially, the article seeks to understand consumers' intention to buy from a particular retailer by extending and exploring current branding knowledge in the virtual environment from a retailer's perspective. The first section of the article develops a literature-based conceptual model and hypotheses. This is followed by a hypothesized empirical study addressing the hypotheses proposed. Results are analyzed in a systematic and precise way by structural equation modeling [5]. The soundness of the research design is addressed more in the discussion part.

CONCEPTUAL MODEL

Product Brand vs. Service Brand

Considerable discussion has arisen about how electronic commerce is changing retail marketing theory and practice [12]. Brand, a traditionally focused topic in marketing, should gain new perspective and investigation in understanding consumer behavior in the significantly new environment.

A brand can be defined as "a name, term, sign, symbol, or design, or combination of them which is intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competitors" [27]. These individual brand components are here called "brand identities" and their totality "the brand" [26].

The natural inclination in marketing is to associate branding with goods. Through product, package, and logo design, marketers leverage the materiality of goods in their branding efforts. They affix the brand name to the product and show the product in advertising, often associating it with distinctive symbols, signature statements, their attributes and people [7].

Brand development is especially crucial in services, given the inherent difficulty in differentiating products that lack physical differences [50] and the intense competition within service markets. It is also argued that service delivery

through global computer networks will dramatically change the nature of service marketing [40]. For the marketing of services, De Chernatony and Dall'Olmo Riley [13] and Padgett and Allen [34] suggest that the brand should be used to give attention to the way in which customers perceive the meaning of the service and, as such, develop associations to the brand.

These ideas appear to transfer directly to the electronic-commerce environment [12]. Taking virtual shopping mall as an example, an online retailer provides a bundle of products each with different brand. The brand of an online retailer can be differentiated from the products they sell in that it is named not after one particular brand and the judgement of the retailer's brand is far beyond the physical condition of the products it provides. In specific, a good can be conceptualized, at least in part, as a physical entity composed of tangible attributes which buyers purchase to satisfy specific wants and needs [30], a lot of service issues are closely related to an online retailer's brand, such as, payment, delivery, customer service other than visible attributes of the products it offers. At the same time, online retailer promote their own brand independently from their providing and the former deserves much more efforts than the latter in most circumstances.

Therefore, according to the purpose of the study, brand referred here is an online retailer's brand, a kind of service brand. Service intangibility and the salient role of service in customer value creation focus consumer attention on the company as an entity with services, the company as a whole is usually viewed as the provider of the experience. Thus, service in nature as well as even intense complexity brought by virtual environment place the brand of an online retailer in a conspicuous position that should gain great emphasis in marketing activities. This notion should be clarified from product brand at the first place.

Brand Knowledge

The importance of knowledge in memory to consumer decision making has been well documented [1]. Understanding the content and structure of brand knowledge is important because they influence what comes to mind when a consumer thinks about a brand – for example, in response to marketing activity for that brand.

According to the associative network memory model, semantic memory or knowledge is viewed as consisting of a set of nodes and links. Nodes are stored information connected by links that vary in strength. A "spreading activation" process from node to node determines the extent of retrieval in memory [7]. A node becomes a potential source of activation for other nodes either when external information is being encoded or when internal information is retrieved from long-term memory. Activation can spread from this node to other linked nodes in memory. When the activation of another node exceeds some threshold level, the information contained in that node is recalled. Thus, the strength of association between the activated node and all linked nodes determines the extent of this "spreading activation" and the particular information that can be retrieved from memory.

Keller [26] defines brand knowledge, to be consistent with the associative network memory model, as consisting of a brand node in memory to which a variety of associations are linked. Since widely adopted by many researchers (e.g., [12];

Berry [7]), the definition and dimension of brand knowledge by Keller [26] are incorporated here as the start point for further analysis.

The **first dimension** distinguishing brand knowledge is **brand awareness**. It is related to the strength of the brand node or trace in memory, as reflected by consumers' ability to identify the brand under different conditions [9]. In particular, brand name awareness relates to the likelihood that a brand name will come to mind and the ease with which it does so. Brand awareness plays an important role in consumer decision making for two major reasons. First, it is important that consumers think of the brand when they think about buying related products. Raising brand awareness increases the likelihood that the brand will be a member of the consideration set [32], the handful of brands that receive serious consideration for purchase. Second, brand awareness affects consumer decision making by influencing the formation and strength of brand associations in the brand image. A necessary condition for the creation of a brand image is that a brand node has been established in memory, and the nature of the brand node should affect how easily different kinds of information can become attached to the brand in memory.

According to Keller [26], **brand image, another dimension** of brand knowledge, is defined as perceptions about a brand as reflected by the brand associations held in consumer memory. Brand associations are the other informational nodes linked to the brand node in memory and contain the meaning of the brand for consumers. The favorability, strength, and uniqueness of brand associations are the dimensions distinguishing brand knowledge that play an important role in determining the differential response that makes up brand equity.

The dimensions of brand knowledge and the associated network memory model can help us understand the role of brand knowledge in online consumer behavior.

Perceived Risks

Perceived risk, a fundamental concept in consumer behavior, is a multi-dimensional construct (e.g., [25]; [30]) which implies that consumers experience pre-purchase uncertainty as to type and degree of expected loss resulting from the purchase and use of a product [11]. In his seminal paper on risk taking, Bauer [4] enunciated the theme that consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he or she views with some amount of uncertainty.

The concept of risk implies that most individuals make purchase decisions under some degree of uncertainty about a particular product and/or brand [31]. Conceptualized as the likelihood of negative consequences (i.g., danger, loss, etc.), perceived risk represents consumer uncertainty about loss or gain in a particular transaction and has six components (e.g., [9]; [22]): financial, performance, social, psychological, safety, and time/convenience loss.

In specific, financial risk refers to the probability that purchase results in loss of money or other resources. Performance risk refers to the probability that a product purchased results in failure to function as expected. Social risk refers to the probability that a product purchased results in disapproval by family or friends. Psychological risk refers to the probability that a product results in inconsistency with self-image. Physical risk refers to the probability that a

product purchased results in personal injury and time risk refers to the probability that a purchase results in loss of time to buy or retain the product. Overall perceived risk represents the aggregate impact of these various factors.

Model Development

From the standpoint of marketers, brand knowledge can be increased through marketing mix strategies and tactics by providing external information. The psychological implication is to provide enough cues to arouse nodes' "spreading activation" and bypass the threshold for effective memory, thus evoke brand awareness and establish good brand image. If a brand is well known and has good image in consumers' minds, it plays a special role in service companies because strong brands increase consumers' trust of the invisible purchase. Strong brands enable customers to better visualize and understand intangible products. They reduce consumers' perceived monetary, social, or safety risk in buying services [7].

The e-commerce environment is obviously risky [43]. Compared with product brand and pure service brand, store brand, as a specific service brand, has more risks associated. Other than privacy and security risks which we have extensively mentioned above, the real performance of the products that online providers sell is also related to the overall risk perceived by prospective consumers. People are afraid of their benefits being damaged by service provided in a more uncertain environment. Therefore, in online retailing sector, brand is assumed to play an even more important role than other kinds of services and products.

When promises about the marketing offering related to the brand are made to consumers by advertising and other forms of communication, informational nodes are created that are linked to the brand's node in memory. These informational nodes contain the meaning of the brand for consumers. In essence, the brand and its image create a cognitive summary and assist the consumer by capturing the overwhelming quantity of brand-related communications, funneling it down to a useful size and meaning [40]. The integrated warranty by brand knowledge can reduce perceived risk as a result, as depicted by Richards [38]—a strong brand is "a safe place for customers". Thus, we propose,

H1: Prospective consumers' brand knowledge toward an online retailer is negatively related to their perceived risk of buying from the retailer.

At the same time, it's logic to get that compared with perceived risk in traditional retailing environment, perceived risk in online context can influence buying intention more significantly, which can be indirectly proved by the prevailing hesitance to shop online among the large audience. So, adopting intention can be determined by perceived risk to a large extent.

H2: Prospective consumers' perceived risk of buying from the retailer is negatively related to their intention to adopt the retailer.

In sum, brand knowledge can also have impact on adoption intention by the mediating effect through perceived risk.

Other than this mediating effect on adopting intention transmitted by perceived risk, brand knowledge is assumed to have direct impact on adopting intention, based on its function as a source of consumer value creation. Brand impact shifts from product to company as service plays a greater role in determining consumer value [8]. Personal

value or benefits consumers attach to a service brand is, what consumers think the service can do for them. Benefits can be further distinguished into three categories according to the underlying motivations to which they relate [35]: (1) functional benefits, (2) experiential benefits, and (3) symbolic benefits. Functional benefits are the more intrinsic advantages of service consumption and usually correspond to the product-related attributes. These benefits often are linked to fairly basic motivations, such as physiological and safety needs [29], and involve a desire for problem removal or avoidance [16] [39]. Experiential benefits relate to what it feels like to use the product or service and also usually correspond to the product-related attributes. These benefits satisfy experiential needs such as sensory pleasure, variety, and cognitive stimulation. Symbolic benefits are the more extrinsic needs for social approval or personal expression and outer-directed self-esteem. Hence, consumers may value the prestige, exclusivity, or fissionability of a brand because of how it relates to their self-concept [41]. Since a well known brand can be associated with many kinds of value or benefits, we propose that,

H3: Prospective consumers' intention to adopt an online retailer is positively related to their brand knowledge toward the online retailer.

Further, Marketing theorists conceive that consumers develop ways of reducing risk by searching for information that enables them to act with a degree of confidence in situations of uncertainty (e.g., [4]; [31]). Because services appear to create particularly uncertain and risky purchase situation, it is logical to expect that consumer acquire information as a strategy of risk reduction in the face of this specific uncertainty.

In general, the greater the degree of perceived risk in a prepurchase context, the greater the consumer propensity to seek information about the service. The role of risk in the consumption of services has been addressed both conceptually (e.g., [15]; [50]) and empirically (e.g., [0]; [31]).

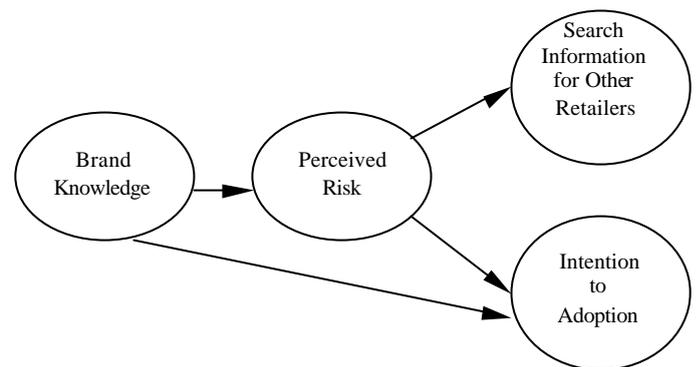
Consumer information sources can be classified into two broad types, internal and external, both types are used by consumers to gather information and cope with perceived risk. The marketing literature is replete with evidence suggesting that external information search represents a motivated and conscious decision by the consumer to seek new information from the environment (e.g., [36]). In online environment, surfing is the major searching means to acquire information. Although personal communication is more effective in convincing consumers, due to the very dispersed distribution of the Internet users, personal communication effects, especially word-of-mouth, are almost impossible and thus ignorable. So, consumers usually resort to some searching engines to acquire relevant information to grant an advisable decision. Searching behavior has gain the attention of marketers on the condition that through searching online raised the risks faced by the retailer that has been taken into consideration set. While, since searching online for information about other retailers is the major exclusive outlet to release perceived risks in the virtual environment, with the increase of perceived risk, this action will surely increase and wise versa. Thus, we propose that,

H4: The action that searching information about more retailers online can be reduced with less perceived risk.

This relation is crucial to a retailer in that searching information raises the risks faced by the retailer by expanding consumers' opportunity to find more favourable choices, which in turn would lower their intention to adopt the existing retailer.

To sum up clearly, our conceptual model for consumers' adoption intention to an online retailer is depicted as shown in Figure 1.

FIGURE 1: A MODEL TO INTERPRET CONSUMER'S INTENTION TO CHOOSE FROM AN ONLINE RETAILER



If the hypotheses are supported and a large variance of intention to adopt can be explained by this model, online retailers marketing efforts which can be used to set up brand knowledge are worth to be highly cherished, rather than waste the energy too much on uncontrollable issues and accept the reality passively.

METHODOLOGY

Research Design

By realizing that marketers' efforts in creating brand knowledge are long-term based and thus hard to create in a short-term experiment setting, we conduct an online survey to test our conceptual model and substantive hypotheses. In previous studies concerning brand management, perceived risk and online consumer behavior (e.g., [31]; [10]; [0]; [49]; [21]; [23]), research designs are no more than such traditional methods as factorial design, nested design etc. and the analytical tools are always ANOVA, MANOVA, regression etc., or exploratory factor analysis for exploratory research. To surmount these old methods and to make a breakthrough in online consumer behavior area, structural equation modeling, a more powerful analysis tool [19], is used to guide the research design and the systematic analysis procedure.

Context, Sampling Strategy

Existing Internet users are our target population. Called from the requirement by structural equation modeling, our expected sample size is 800 or above. To be well accessed to the population, well-designed questionnaire with close-end questions are published on two reputable searching engine websites in Hong Kong.

Such issues as evaluation objective or selected online retailers, websites for publishing, measurement reliability are considered before the formal test. To ensure the variation in brand knowledge, which is a prerequisite for an expected effect size, the online retailers selected must have significant variation in terms of this construct. A focused group composed of volunteered Internet users is organized for the purposes of choosing 4 highly agreed upon online retailers as the evaluation objectives and getting some preliminary measure items for constructs that are first used in this study. According to some studies [47] [42], Internet retail stores can be classified into different forms, which differ in terms of the variety and types of products offered, price, advertising and promotional efforts, and service. Thus, to minimize the random error from factitious specification, we choose retailing stores which provide a variety of fix priced products in many categories, not include those for special industry, such as industry product or chemistry products. Understanding that online environment is a situation full of unexpected risks and accidents, consumer's behavior and thinking can be explained by many uncontrolled or specified variables, which need more caution in defining the context for our study.

Note also that we choose websites on a local basis. Although once a website is published it can be accessed globally, there are still some issues that can't go beyond the geographical barriers, which is deemed to affect our results and the explanation. For example, the brand knowledge to Amazon, a world-known retailing brand for an online bookstore, should be high. While, since it's physical distribution center locates in US, it sells products charged in US dollar, a high premium for shipment will be charged to overseas buyers and the charge rates change with distance, consumers in Hong Kong might consider the perceived risk and their buying intention differently from consumers in US due to reasons other than variation in brand knowledge. Additionally, some demographic issues as household income are assumed to relate directly with perceived risk. Although we can't avoid these errors totally, that we choose Hong Kong, a region with relatively higher income level, Internet development, and convergent lifestyle, as the geographic base might hopefully reduce the random error greatly.

Data Collecting Procedure

By cooperating and negotiating with senior managers of two reputable search engine websites, informing emails of the presence, rough purpose description, incentives, period of validity of the survey are sent to their newsletter subscribers' email addresses according to the records available from their users' database. Emails are sent under the nominal of respective website. We promise to offer 10 prizes with HK\$3000 each for random selected winners from all completed questionnaire. Pretest shows that it's an attractive stimulus for tasks like this. Although this action will increase the research cost, a higher respondent rate and reduced random error (respondents are supposed to treat it more seriously) are optimally expected [48].

Receivers can click the highlighted hyperlink in the email and instantly access the website publishing our pretested questionnaire.

Respondents are first asked some general questions about their Internet use and demographics. This information serves dual purposes. On the one hand, it is used to verify whether

our sample is a representative sample of average online population which will influence the generalizability of our results, it is used to composite control variables on the other. Subsequently, every respondent needs to indicate all measures of each construct for all four retailers in sequence and independently. The survey minimizes halo effects by allowing indicators of the constructs to be separated by several other questions [45]. Possible errors from the order arrange of retailers are avoided by publishing two versions of questionnaire containing all the same questions with only the order of retailers varied by randomization process.

Measure Development

Measures of all constructs are developed using guidelines recommended by [33]. The domain of the relevant construct first is specified. For widely agreed construct, we borrow items from previous literature. Other items are drafted on the basis of their mapping with the construct's conceptual definition. Most of the items are recorded on a seven-point agree-disagree format. Items are pretested for clarity and appropriateness and are rewritten if necessary.

Exogenous Variable: Brand Knowledge

According to the definition of brand knowledge, no single number or measure captures brand knowledge (BRKN). Rather, brand knowledge should be thought of as a multidimensional concept that depends on (1) what awareness structures are present in the minds of consumers and (2) what image about the retailer has in consumer's heart. As a two-dimensional construct, the respondents' brand knowledge is indicated by brand awareness as well as brand image [26]. For measurement of brand awareness, two-item 7-point Likert-type scale from strongly disagree to strongly agree is used. For example, respondents are asked, "Can you recognize this brand as having been previously seen or heard". Similarly, brand image is measured by six-item Likert scale, with each item measures the type, favorability, strength, uniqueness, congruence, and leverage respectively [26]. For instance, to measure favorability, respondents are asked to rate the evaluations of the brand associations. Totally, eight items are used to measure brand knowledge.

Endogenous Variables

Perceived Risk. Although the literature reflects a wide variety of measures of perceived risk (PERISK), the measures employed in this research are intended to collect data treating risk as a two dimensional construct that consists of uncertainty and "importance of loss" (e.g., [14]). Consistent with other risk research (e.g., [22]; [51]), this study involved a number of specific measures that are derived from pervious risk research literature, although it is necessary to slightly modify item statements to accommodate to service and online environment nature. After perceived risk is defined for six kinds of risks, identified before, respondents are asked to indicate the likelihood of occurrence and importance of each risk. Respondents are recorded on seven-point scales ranging from "1 = very unlikely" to "7 = very likely" and "1 = very unimportant" to "7 = very important". For example, perceived monetary risk is measured on the basis of responses given to "How likely do you feel it would be that you would suffer a monetary loss because of shopping from

the retailer?" and "How important do you consider a money loss resulting from such a shopping". Seven-point scales are used to facilitate comprehension and reduce respondent fatigue.

In previous research the likelihood and importance dimensions have been combined both additively and multiplicatively [49]. Although both approaches have been questioned on a number of grounds, the multiplicative model has been more widely accepted [4] [49]. Consequently, perceived risk is measured as a multiplicative function of the likelihood and importance components. Thus, a maximum score of 49 would result if a respondent feels very likely to suffer the risk as a result of adopting on online retailer and that the risk is very important. Conversely, a minimum score of 1 would occur when a respondent indicates that suffering the risk is very unlikely and that the risk is very unimportant.

Information Search. Different from information search mentioned in other studies (e.g., [10]), to be pertaining to our research interests and be consistent with our conceptual model this construct is specified here as search actions in online environment. Since no previous theoretical work has been done to operationalize this construct, we conduct an exploratory research to get the measures before they are incorporated into later data collection and final analysis. A seven point Agree/Disagree scale is used and to measure all items for information search. For example, one of the items is "I would search for more information through searching engines before buying product from the retailer."

Intention to Adopt. By this construct, intention to adopt (INDO), here we mean respondents' propensity or tendency to buy products from the specified retailer. In most cases, the purchase intent question consists of asking the respondent to assess his or her chances or state his or her purchase intent to buy a given product over a fixed time frame [6]. We borrow the items from previous research [6] and necessary modifications are made to adjust to our research context. This construct is indicated by a four-item scale and these items index the respondents' consideration of buying any product from the online retailer in consideration. Although it's recommended that two or three years time span is appropriate for measuring the variable, the rapid upgrade of Internet and its associated products makes us doubt on its soundness in our case. Interviews with expertise in electronic and information area indicate this could be operationalized as three months or less. An example of an item for this scale is, "How likely are you to buy a product from this online retailer during the next three months? [very unlikely; very likely]"

Control Variables

Our subtle research design, especially websites selection as defend previously, has excluded lots of exogenous variable that would have impacts from interacting with our considered variables. While, due to the complexity of the problem, there still have some exogenous variables beyond the above considerations that might hamper our results. To get more valid research findings, we incorporate some control variables into the analysis by the principle-of-thumb.

Demographic Profile Variables. Several demographic variables are assumed to affect consumers' perceived risk and intention to adopt [49].

1. Income: Measured as the natural log of self reported annual household income.

2. Education: several surveys suggest that the online population is highly educated. For example, over 50% of those surveyed by the "GVU surveys" (www.gvu.gatech.edu/user_surveys) have college education or higher. A dummy variable taking the value 1 if the male head-of-household has earned a bachelors or higher level degree and taking the value 0 otherwise.

3. Home Ownership: A dummy variable taking the value 1 if the household owns a home, and the home is their primary place of residence. The variable takes the value 0 otherwise. This variable is supposed to affect intention-to-buy and thus affect price sensitivity in turn.

Since these demographic constructs are not independent, a fact which has caused considerable problems in earlier research, we perform a principal component analysis to construct orthogonal demographic profile meta-variables.

Internet Use Frequency. This construct is measured by partitioning the use hours per week into 7 levels, and each level is denoted by a digital symbol from 1 to 7.

Risk Preference. Individual's risk preference should have some relationship with perceived risk and have direct relationship with intention to adopt or try apparently. Risk preference is traditionally measured by eight-item 7-point Likert-type scale from strongly disagree to strongly agree.

These control variables are allowed to relate with hypothesized constructs in the model, besides, they are also permitted to correlate with each other. The parameters' existence and magnitude estimations are subjected to structural equation modeling.

ANALYSIS

Measure Validation Procedures

Prior to testing the hypotheses, the multi-item measures are subjected to a series of validity checks. Since multiple Likert Items on seven-point scales are asked for all four variables, the measurement model is then estimated using confirmatory factor analysis (using LISREL 8: [24]) to assess the convergent and discriminant validity of these constructs and to improve these properties, if necessary by deleting poorly fitting items [3].

By using structural equation modeling, the reliability of measures can also be assessed by analyzing the theta-delta matrix. Squared multiple correlations for variables are also need to check for the captured variance of each construct by our measures. The average variance extracted statistics exceed 0.5, the conventional requirement, and the composite construct reliabilities [46] exceed the usual cutoff of 0.70 [33] would support the convergent validity of the constructs.

Test of the Hypotheses

We use structural equation modeling to estimate parameters under concern. First, we ascribe all data to test the hypotheses directly. The covariance matrix, standard deviation and mean of the raw data are used to run the LISREL program. Maximum Likelihood (ML) solution is also used to get the fitted model and estimates.

In terms of our hypotheses concerning the four specified correlations among constructs, significant values of all specified β , hypothesized path parameters, show as a support. Before any confirmative or definite conclusions being made directly from β , such factors as administration

check, fit indexes, squared multiple correlations for X-variables much be check in advance to ensure that all are at a satisfactory or at least acceptable level. Besides, the overall variance exacted by the model is also examined to canvass about the effect size, which is concerned to the practical meaning of our proposed problem significantly.

To make our results more powerful or convincible, four groups are compared based on the same conceptual model, with all respondents for one retailer taken as a different group from respondents for another retailer. From our research design, we know each groups are composed of same individuals and of course the sample size for all groups is same. From the procedure suggested by Gordon Cheung [19], some invariance tests are performed to make strong cross-group comparisons. The main and eventual purpose is to test whether there is significant difference in terms of latent means, especially brand knowledge as comparable to a manipulation check. Of course other invariance tests, also the prerequisite for meaningful latent mean compare, such as configural invariance which tests the pattern of significant factor loadings between manifest and latent variables for invariance, factorial invariance which tests whether members of different group ascribe the same meanings to survey items are also performed to give deeper implications.

DISCUSSION

It's expected that with our carefully designed methodology in terms of sampling and analytical tool, random errors are under control to a great extent. Most rationales for our research design have been defended before. While, here we still want to give a whole picture of all the advantages of our research for an easily followed reference.

First, many extraneous variables that would hamper the reliability and validity of the findings are constrained by within subjects comparison across groups. Many of the constructs incorporated here, such as perceived risks, searching action, are vulnerable to the demographic variables. If the demographic profiles are significantly different across groups, any significance tested out can far or less beyond the interpretation power of the proposed model. Additionally, this arrangement can increase the overall sample size, which is important in structural equation modeling, to test the hypotheses directly.

Second, structural equation modeling, a powerful tool which has been widely recognized in statistic analysis and result tests, haven't been well used in the new virtual business environment, a future for business development. Our research is a good attempt for this purpose. Although we measure our constructs mostly by existing measures (with modification if necessary), we got a big breakthrough in that factor loadings from different items are permitted to vary by the help of LISREL. Nevertheless, online summated scale, based on an obviously defective assumption that all factor loadings are same, can be used to measure these constructs in previous studies (e.g., [10]; [49]).

Other advantages include efforts to raise the responding rate, reduce random errors etc., which we have mentioned extensively previously.

This study, like most, is subject to limitations. Although we've elaborate the advantage of our sampling design, that our empirical study is constrained to one retailing pattern somewhat limits the generalizability of our results. Therefore, additional study of the model in the context of

more divergent retailing patterns is warranted. Additionally, we know conducting a survey would encounter a great amount of exogenous variables, some of which we don't even know. Hopefully, our elaborate research design on sample frame, implementation, control variables selection etc. can allay this negative impact to a small extent.

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